REMARKS

Claims 1-3 and 9-16 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the reasons noted in the official action while claims 4-8 are objected to for the noted reasons. The rejected claims 1-8 are canceled while the rejected claims 9-16 are accordingly amended, by the above claim amendments, and the presently pending claims are now believed to particularly point out and distinctly claim the subject matter regarded as the invention, thereby overcoming all of the raised § 112, second paragraph, rejections. The entered claim amendments are directed solely at overcoming the raised indefiniteness rejection and are not directed at distinguishing the present invention from the art of record in this case.

In addition, claims 9 and 10 are objected to for the reasons noted in the official action. The above requested claim amendments are believed to overcome all of the raised informalities concerning the claims. If any further amendment to the claims is believed necessary, the Examiner is invited to contact the undersigned representative of the Applicant to discuss the same.

Next, claims 1, 2, 3, 9 and 10 are rejected, under 35 U.S.C. § 103, as being unpatentable in over Robin et al., United States Patent No. 4,871,460 (hereinafter Robin `460) in view of Vaughan, United States Patent No.2,189,015 (hereinafter Vaughan `015). The Applicant acknowledges and respectfully traverses the raised obviousness rejection in view of the above amendments and the following remarks.

Robin `460 arguably relates to extraction of impurity components from an industrial liquid, by using supercritical carbon dioxide in liquid form with the carbon dioxide being applied in a counterflow direction to a flow of liquid in a solvent extraction column with the purified liquid and the contaminant laden carbon dioxide being discharged separately from each other. The extraction method, disclosed by Robin `460, is in fact a special extraction method adapted for treating condensate containing free diisocyanate. Extraction takes place by simple contact between the condensate and the extraction gas, whereby the contact between the condensate and the extraction gas can be enhanced by filling the column with a packing (see column 4, lines 25-29). The contact between the condensate and the extraction gas is mostly happenstance.

As indicated above, the contact between the condensate and the extraction gas is enhanced depending on the packing material and perhaps the diameter of the solvent extraction column, however, it is respectfully submitted that it is primarily still just happenstance. In particular, the method disclosed by Robin `460 does not comprise any mixing or stirring of the condensate with the extraction gas or any other mechanical action as specifically recited by the clams.

The extraction method, according to the presently claimed invention, does not necessarily mix or stir the liquid to be purified and the extraction gas either, however, according to the claimed process, contact between the liquid and dispersion and the extraction gas is substantially enhanced and actively effectuated by applying the liquid or dispersion as a thin film in the reactor and constantly renewing the film over at least a portion of the layer thickness of the thin film by mechanically acting on the liquid or dispersion. Due to the fact that the liquid or dispersion is applied as a thin film, the surface of the liquid or dispersion exposed to the extraction agent is maximized. Further, due to the fact that the surface of the thin film is constantly renewed by the mechanical treatment of the liquid or dispersion, it is possible to exert shearing and milling forces to the film which accordingly provoke high turbulence within the interior of the film, thus constantly conveying new partial regions of the layer thickness to the surface of the layer. This results in that the distribution of the substance to be extracted from the liquid or the dispersion is constantly evened out so that the extraction can be carried out in a very efficient way. It must be emphasized that mechanical acting on the liquid or dispersion, in order to constantly renew the surface of the thin film and the liquid or dispersion to be purified, does not get mixed with the extraction agent.

Turning now to the extraction method disclosed by Vaughan `015, the Examiner argues that Vaughan `015 teaches utilization of a cylindrical rotor filling a substantial interior volume of a cylindrical extraction column, whereby the radial ends of rotor blades are closely adjacent the walls of the cylindrical column, so as to inherently form and maintain a thin film in the annulus between the rotor surface and the column interior surface. The Examiner apparently concludes that it would have been obvious to utilize the design of the Vaughan `015 extraction

column for the column of Robin `460 in order to more thoroughly mix carbon dioxide and the liquid to be purified.

As noted above, the presently claimed invention is not specifically concerned with "mixing" the extraction agent with the liquid to be to be purified. Therefore, the Applicant asserts that the method disclosed by Vaughan `015 is not properly compared to the instant invention at all. While Vaughan `015 aims at thoroughly mixing the extraction agent with the liquid to be purified so as to effect contact of the interior flow volume of the liquid with the extraction agent, the pending claims relate to a method of applying the liquid to be purified as a thin film in the reactor and enhancing contact between the extraction agent and the thin film without obtaining a mixture thereof. Thus, the presently claimed invention uses a completely different technique of exposing as much surface of the liquid to be purified as possible to the extraction agent than the arrangement of Vaughan `015.

The Examiner asserts, in the second paragraph on page 4 of the Office Action, that Vaughan `015 teaches mixing carbon dioxide with the liquid to be purified, whereas in the first paragraph of page 4 the Examiner seems to argue that the rotor is provided to form and maintain a thin film in the annulus between the rotor surface and the column interior surface. According to column 4, lines 8-9 of Vaughan `015, the rotor is brought up to the normal operating speed, which is 17,000 RPM. Clearly, with the rotor rotating at such high speed it is respectfully submitted that it is not possible to apply the liquid to be purified as a thin film and to constantly renew the surface of the thin film, as recited by pending claim 9. Rather, it is respectfully submitted that such a rotor, as taught by Vaughan `015, results in a disintegration of the liquid by stirring so that the liquid gets throughly mixed with the extraction agent. Thus, in the annulus between the rotor surface and the column interior surface of Vaughan `015 there is no thin film of the liquid to be purified and the extraction agent. In this connection it is referred to in column 4, lines 57-59 of Vaughan `015, that due to the action of the rotor, the liquid is broken into a discontinuous state due to the agitation of the stirrer blade.

In summation, the Applicant adamantly asserts that the combination of Robin `460 and Vaughan `015 fails to in any way teach, suggest, disclose or even hint at the essential apparatus features and method steps as presently recited in claims 9 and 17 according to which

the liquid to be purified is applied as a thin film in the reactor and the surface of the thin film is constantly renewed over at least a portion of the layer thickness of the thin film by mechanically acting on the liquid of dispersion. Consequently, it is respectfully submitted that the combination of Robin `460. and Vaughan `015 fails to render obvious the presently claimed invention and that rejection should be withdrawn at this time.

Next, claims 3, 11-13, 15 and 16 are rejected, under 35 U.S.C. § 103, as being unpatentable over Vaughan `015 in view of Robin `460. The Applicant acknowledges and respectfully traverses the raised obviousness rejection in view of the above amendments and the following remarks.

The rejection is again based upon the above discussed teachings of Vaughan `015 and Robin `460. In order to more clearly recite the inventive device according to claim 11 from the device of Vaughan `015, the subject matter of claim 12, namely, the radial arms of the rotor carry rods, scrapers, wipers or rollers extending in the direction of the axis of rotation, is incorporated into independent claim 11. According to the present invention, the rod, scraper, wiper or roller structures extending in the direction of the axis of rotation and are used to form and maintain a thin film within the reactor. The device of Vaughan `015 does not disclose such rods, scrapers, wipers or rollers extending in the direction of the axis of rotation. The blades 53 of Vaughan `015, referred to by the Examiner as being comparable with the rods, scrapers, wipers or rollers, are actually mixing assemblies (see column 3, lines 15 and 16). The Applicant therefore respectfully asserts that Vaughan `015 fails to in any way teach, suggest, disclose or hint at any blades for applying a thin film of a liquid in the reactor. It is therefore, believed that the subject matter of amended claim 11--which now incorporates the features of claim 12--is not obvious in view of the combination of Vaughan `015 in view of Robin `460 and that raised combination of art should be withdrawn at this time in view of the forgoing.

Lastly, claim 14 is rejected, under 35 U.S.C. § 103, as being unpatentable over Vaughan `015 in view of Robin `460, as applied to claims 3, 11-13, 15 and 16, and further in view of Holl, United States Patent No. 6,752,529 (hereinafter Holl `529). The Applicant acknowledges and respectfully traverses the raised obviousness rejection in view of the above amendments and the following remarks.

The Applicant acknowledges that the additional references of Holl `529 may arguably relate to the features indicated by the Examiner in the official action. Nevertheless, the Applicant respectfully submits that the combination of the base references of Vaughan `015 and/or Robin `460 with this additional art of Holl `529 still fails to in any way teach, suggest or disclose the above distinguishing features of the presently claimed invention. As such, all of the raised rejections should be withdrawn at this time in view of the above amendments and remarks.

If any further amendment to this application is believed necessary to advance prosecution and place this case in allowable form, the Examiner is courteously solicited to contact the undersigned representative of the Applicant to discuss the same.

In view of the above amendments and remarks, it is respectfully submitted that all of the raised rejections should be withdrawn at this time. If the Examiner disagrees with the Applicant's view concerning the withdrawal of the outstanding rejections or applicability of the Vaughan `015, Robin `460 and/or Holl `529 references, the Applicant respectfully requests the Examiner to indicate the specific passage or passages, or the drawing or drawings, which contain the necessary teaching, suggestion and/or disclosure required by case law. As such teaching, suggestion and/or disclosure is not present in the applied references, the raised rejection should be withdrawn at this time. Alternatively, if the Examiner is relying on his/her expertise in this field, the Applicant respectfully requests the Examiner to enter an affidavit substantiating the Examiner's position so that suitable contradictory evidence can be entered in this case by the Applicant.

In view of the foregoing, it is respectfully submitted that the raised rejections should be withdrawn and this application is now placed in a condition for allowance. Action to that end, in the form of an early Notice of Allowance, is courteously solicited by the Applicant at this time.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

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